Non-Structural Analysis and Damage 1

Course Information

Developers: Automotive Collision and Repair State Curriculum Committee


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Credit Hours: 4

Description:

Through a variety of classroom and/or shop/lab learning and assessment activities, students in this course will: explore the components of safety pertaining to auto collision and repair; explore the parts and construction of vehicles; explore opportunities in the auto collision industry; identify metal straightening techniques; identify the application and use of body fillers; demonstrate proper use, set-up and storage of welding equipment; distinguish between weldable and non-weldable materials; demonstrate fundamental industry standard recommended welds; identify plastics and adhesives used in automotive industry; explain the general purpose of damage, estimation and repair orders; explore the processes required for outer body panel repairs, replacements and adjustments; and demonstrate fundamental cutting procedures.

Exit Learning Outcomes

Program Outcomes

A Analyze automotive structural damage and repair requirements
B Analyze automotive non-structural damage and repair requirements
C Diagnose and repair collision-damaged mechanical and electrical components
D Demonstrate automobile painting and refinishing skills
E Demonstrate safe working habits and procedures within an auto collision/repair facility

External Standards

by meeting any institution-required NATEF Tasks from the criteria outlined below. NATEF Guidelines of: 95% of HP-I items must be taught in the curriculum; 90% of HP-G items must be taught in the curriculum
2.A Preparation
2.B Outer Body Panel Repairs, Replacements, and Adjustments
2.C Metal Finishing and Body Filling
2.E Metal Welding and Cutting
2.F Plastics and Adhesives
4.A Safety Precautions

Competencies

Explore the components of safety pertaining to auto collision and repair

Properties
Domain: Cognitive  Level: Analysis

Linked Program Outcomes
Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards
4.A Safety Precautions
DAM02: Frontal Impact Analysis
MEA01: Measuring
SSA01: Structural Straightening Aluminum

You will demonstrate your competence:
- in the classroom or classroom shop setting
- you identify safety standards for the collision repair industry
- you identify safety equipment
- you identify hazardous materials related to the collision repair industry
- 4.A.1 Identify and take necessary precautions with hazardous operations and materials according to federal, state, and local regulations. HP-I
- 4.A.2 Identify safety and personal health hazards according to OSHA guidelines. HP-I

Explore the parts and construction of vehicles

Properties
Domain: Cognitive  Level: Analysis

Linked Program Outcomes
Analyze automotive structural damage and repair requirements
Analyze automotive non-structural damage and repair requirements

You will demonstrate your competence:
- in the classroom or classroom shop setting
- through an instructor-provided evaluation

Explore opportunities in the auto collision industry

Properties
Domain: Cognitive  Level: Analysis
You will demonstrate your competence:
- through an instructor-provided evaluation
- in the classroom or classroom shop setting

Identify metal straightening techniques

Properties
Domain: Cognitive  Level: Application

Linked Program Outcomes
- Analyze automotive structural damage and repair requirements
- Analyze automotive non-structural damage and repair requirements

Linked External Standards
- 2.B Outer Body Panel Repairs, Replacements, and Adjustments
- 2.C Metal Finishing and Body Filling
- DAM02: Frontal Impact Analysis
- DAM03: Mechanical Systems Analysis
- DAM05: Aluminum Panels And Structures Damage Analysis
- DAM06: Steering And Suspension Damage Analysis
- DRT01: Drivetrains And Engine Mounts
- FCR01: Fundamentals Of Collision Repair
- MEA01: Measuring
- PRA01: Replacing Aluminum Exterior Panels
- STA01: Cosmetic Straightening Aluminum
- STS01: Cosmetic Straightening Steel
- EDSO1: Non-Structural Supplement Diagnose electrical concerns Complete headlamp and fog/driving lamp assemblies and repairs Demonstrate self-grounding procedures for handling electronic components Determine diagnosis, inspection and service needs for brake system hydraulic components Examine components of heating and air conditioning systems Determine the inspection, service and repair needs for collision damaged cooling system components Distinguish between the under car components and systems Determine the diagnosis, inspection and service requirements of active and passive restraint systems

You will demonstrate your competence:
- in the classroom or classroom shop setting
- by meeting any institution-required NATEF Tasks from the criteria outlined below. NATEF Guidelines of: 95% of HP-I items must be taught in the curriculum; 90% of HP-G items must be taught in the curriculum

Your performance will be successful when:
- 2.B.1 Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I
- 2.B.3 Determine the extent of damage to aluminum body panels; repair or replace. HP-G
- 2.C.1 Remove paint from the damaged area of a body panel. HP-I
- 2.C.2 Locate and reduce surface irregularities on a damaged body panel. HP-I
- 2.C.3 Demonstrate hammer and dolly techniques. HP-I
2.C.9 Determine the proper metal finishing techniques for aluminum. HP-G

Identify the application and use of body fillers

- **Properties**
  - Domain: Cognitive  Level: Application

- **Linked Program Outcomes**
  - Demonstrate automobile painting and refinishing skills

- **Linked External Standards**
  - 2.C Metal Finishing and Body Filling
    - DAM02: Frontal Impact Analysis
    - EDS01: Non-Structural Supplement Diagnose electrical concerns Complete headlamp and fog/driving lamp assemblies and repairs Demonstrate self-grounding procedures for handling electronic components Determine diagnosis, inspection and service needs for brake system hydraulic components Examine components of heating and air conditioning systems Determine the inspection, service and repair needs for collision damaged cooling system components Distinguish between the under car components and systems Determine the diagnosis, inspection and service requirements of active and passive restraint systems
    - FCR01: Fundamentals Of Collision Repair
    - STS01: Cosmetic Straightening Steel

You will demonstrate your competence:

- in the classroom or classroom shop setting

Your performance will be successful when:

- 2.C.1 Remove paint from the damaged area of a body panel. HP-I
- 2.C.2 Locate and reduce surface irregularities on a damaged body panel. HP-I
- 2.C.3 Demonstrate hammer and dolly techniques. HP-I
- 2.C.6 Mix body filler. HP-I
- 2.C.7 Apply body filler; shape during curing. HP-I
- 2.C.8 Rough sand cured body filler to contour; finish sand. HP-I

Demonstrate proper use, set-up and storage of welding equipment

- **Properties**
  - Domain: Cognitive  Level: Application

- **Linked Program Outcomes**
  - Demonstrate safe working habits and procedures within an auto collision/repair facility

- **Linked External Standards**
  - 2.E Metal Welding and Cutting
    - ADH01: Adhesive Bonding
    - EXTO2: Welded And Adhesively Bonded Panel Replacement
    - WCS01: Steel GMA (MIG) Welding
    - WCS04: Squeeze-Type Resistance Spot Welding

You will demonstrate your competence:

- in the classroom or classroom shop setting
Your performance will be successful when:

- 2.E.4 Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
- 2.E.5 Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. HP-I
- 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I
- 2.E.7 Determine work clamp (ground) location and attach. HP-I
- 2.E.19 Identify different methods of attaching non-structural components (squeeze type resistant spot welds (STRSW), riveting, non-structural adhesive, silicon bronze, etc.) HP-G

**Distinguish between weldable and non-weldable materials**

**Properties**

Domain: Cognitive  Level: Analysis

**Linked Program Outcomes**

Demonstrate safe working habits and procedures within an auto collision/repair facility

**Linked External Standards**

2.E Metal Welding and Cutting
EXT01: Bolted-On Part Replacement
FCR01: Fundamentals Of Collision Repair

**You will demonstrate your competence:**

- in the classroom or classroom shop setting

**Your performance will be successful when:**

- 2.E.1 Identify weldable and non-weldable materials used in collision repair. HP-I

**Demonstrate fundamental industry standard recommended welds**

**Properties**

Domain: Cognitive  Level: Application

**Linked Program Outcomes**

Demonstrate safe working habits and procedures within an auto collision/repair facility

**Linked External Standards**

2.E Metal Welding and Cutting
EXT02: Welded And Adhesively Bonded Panel Replacement
WCS01: Steel GMA (MIG) Welding

**You will demonstrate your competence:**

- in the classroom or classroom shop setting

**Your performance will be successful when:**

- 2.E.2 Weld and cut high-strength steel and other steels. HP-I
- 2.E.4 Determine the correct GMAW (Mig) welder type, electrode, wire type, diameter, and gas to be used in a specific welding situation. HP-I
- 2.E.5 Set up and adjust the GMAW (MIG) welder to "tune" for proper electrode stickout, voltage, polarity, flow rate, and wire-feed speed required for the material being welded. HP-I
- 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I
Identify plastics and adhesives used in automotive industry

Properties
Domain: Cognitive  Level: Application

Linked Program Outcomes
Analyze automotive structural damage and repair requirements
Analyze automotive non-structural damage and repair requirements
Demonstrate safe working habits and procedures within an auto collision/repair facility

Linked External Standards
2.F  Plastics and Adhesives
DAM02: Frontal Impact Analysis
PLA01: Plastic Welding Repair
PLA02: Plastic Adhesive Repair

You will demonstrate your competence:

Your performance will be successful when:

o 2.F.1 Identify the types of plastics; determine repairability. HP-I
o 2.F.2 Identify the types of plastic repair procedures; clean and prepare the surface of plastic parts. HP-I

Explain the general purpose of damage, estimation and repair orders

Properties
Domain: Cognitive  Level: Analysis

Linked Program Outcomes
Analyze automotive structural damage and repair requirements
Analyze automotive non-structural damage and repair requirements

Linked External Standards
2.A Preparation
Explore the processes required for outer body panel repairs, replacements and adjustments

Properties
Domain: Cognitive  Level: Analysis

Linked Program Outcomes
Analyze automotive structural damage and repair requirements

Linked External Standards
2.B Outer Body Panel Repairs, Replacements, and Adjustments
ADH01: Adhesive Bonding
DAM02: Frontal Impact Analysis
DAM04: Restraints, Interior, Glass, Side And Rear Impact Analysis
DAM05: Aluminum Panels And Structures Damage Analysis
EDS01: Non-Structural Supplement
Diagnose electrical concerns
Complete headlamp and fog/driving lamp assemblies and repairs
Demonstrate self-grounding procedures for handling electronic components
Determine diagnosis, inspection and service needs for brake system hydraulic components
Examine components of heating and air conditioning systems
Determine the inspection, service and repair needs for collision damaged cooling system components
Distinguish between the under car components and systems
Determine the diagnosis, inspection and service requirements of active and passive restraint systems

EXTO1: Bolted-On Part Replacement
EXTO2: Welded And Adhesively Bonded Panel Replacement
FCR01: Fundamentals Of Collision Repair
PRA01: Replacing Aluminum Exterior Panels
STA01: Cosmetic Straightening Aluminum
STS01: Cosmetic Straightening Steel

You will demonstrate your competence:
- in the classroom or classroom shop setting

Your performance will be successful when:
- 2.B.1 Determine the extent of direct and indirect damage and direction of impact; develop and document a repair plan. HP-I
- 2.B.2 Inspect, remove and replace bolted, bonded, and welded steel panel or panel assemblies. HP-I
- 2.B.3 Determine the extent of damage to aluminum body panels; repair or replace. HP-G
- 2.B.4 Inspect, remove, replace, and align hood, hood hinges, and hood latch. HP-I
- 2.B.5 Inspect, remove, replace, and align deck lid, lid hinges, and lid latch. HP-I
o 2.B.6 Inspect, remove, replace, and align doors, tailgates, hatches, lift gates, latches, hinges, and related hardware. HP-I
o 2.B.7 Inspect, remove, replace, and align bumper bars, covers, reinforcement, guards, isolators, and mounting hardware. HP-I
o 2.B.8 Inspect, remove, replace and align front fenders, headers, and other panels. HP-I

**Demonstrate fundamental cutting procedures**

**Properties**
Domain: Cognitive    Level: Application

**Linked Program Outcomes**
Analyze automotive structural damage and repair requirements
Demonstrate safe working habits and procedures within an auto collision/repair facility

**Linked External Standards**
2.E Metal Welding and Cutting
EXT02: Welded And Adhesively Bonded Panel Replacement
WCS01: Steel GMA (MIG) Welding
WCS05: Oxyacetylene/Plasma Arc Cutting

**You will demonstrate your competence:**
o in the classroom or classroom shop setting

**Your performance will be successful when:**
o 2.E.2 Weld and cut high-strength steel and other steels. HP-I
o 2.E.3 Weld and cut aluminum. HP-G
o 2.E.6 Store, handle, and install high-pressure gas cylinders. HP-I
o 2.E.18 Identify cutting process for different materials and locations perform cutting operation. HP-I